

Appl. No. 09/135,180
Amdt. Dated December 17, 2003
Reply to Office Action of October 1, 2003

Attorney Docket No. 5586D-6845 (81784.0179)
Customer No.: 26021

REMARKS/ARGUMENTS

Claims 1-20 were pending in the application, with claims 5-20 having been withdrawn. By this amendment, withdrawn claims 5-20 are being cancelled. No new matter is involved.

In paragraph 6 which begins on page 3 of the Office Action, claims 1-3 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,121,192 of Kazui in view of U.S. Patent 5,668,597 of Parulski et al. and further in view of U.S. Re. 36,812 of Tani. In paragraph 7 which begins on page 5 of the Office Action, claim 4 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Kazui '192 in view of Parulski et al. '597 and Tani '812, and further in view of U.S. Patent 6,288,744 of Takahashi. These rejections are respectfully traversed.

Claims 1-3, which were previously rejected in the final Office Action of April 8, 2003, on the combination of Kazui '192 and Parulski '597, are now rejected on the combination of those two references plus Tani '812. Whereas the Office Action states that Kazui and Parulski et al. fail to specifically disclose wherein the electric charge is generated in the second set of light receiving elements are directly discharged from the second set of light receiving elements to the semiconductor substrate in the first image pick-up operation, Tani is said to teach an image pick-up device which includes photo diodes 31, in which the unnecessary charges accumulated in the photodiodes 31 are directly discharged into the substrate 51. Therefore, according to the Office Action, it would have been obvious to one of ordinary skill in the art at the time of the invention, to modify the device in Kazui and Parulski et al. by the teaching of Tani in order to prevent unnecessary electrical charges accumulated by the light receiver from leaking into the signal transfer

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device before the electrical charges accumulated in the light receiver and transferred to the signal transfer device are read.

Claim 4, which is rejected in the final Office Action of April 8, 2003 on the combination of Kazui '192 in view of Parulski et al. '597 and Takahashi '744, is now rejected on those three references in combination with Tani.

As pointed out in applicant's prior responses, in accordance with the present invention, in a first image pickup operation, the first set of light-receiving elements in the image pickup section accumulates electric charges in accordance with incident light, while the second set of light receiving elements in the image pick up section does not accumulate electric charges. In this manner, a thinned-out image signal can be obtained before performing frame transfer to the storage section. In contrast, the image signal in Parulski is not thinned out before performing frame transfer to the storage section. Electric charges corresponding to several lines are eliminated by the fast dump structure 62 after performing frame transfer to the storage section.

Therefore, structures in accordance with the invention are substantially different from those of Parulski. Parulski does not disclose or suggest a structure wherein electric charges are eliminated directly from picture elements.

Regarding Takahashi, applicant previously pointed out that such reference provides a difference in impurity concentrations between vertical and horizontal transfer channels. This is different from the present invention as defined in claim 4.

The newly cited Tani reference teaches that unnecessary charges accumulated in the device are discharged into the substrate. However, such reference does not disclose or suggest that all of the accumulated charges are

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discharged. Moreover, such reference does not disclose or suggest that charges are discarded by controlling voltages applied to transfer electrodes.

Parulski, as previously described, teaches that the information charges are eliminated at the output section.

Thus, a structure in which the accumulated charges of the predetermined pixels are discarded to eliminate the information charges cannot be obtained even by combining the elimination of the information charges at the output section described by Parulski with the structure of Tani in which unnecessary charges are discharged at the device sections.

According to the present invention, all charges are discarded by activating all of the transfer electrodes in the second set of light receiving elements during the first operation. During the second operation, on the other hand, the information electrodes are transferred by activating at least one of the transfer electrodes and deactivating at least one of the other electrodes in all of the light receiving elements. Such structure is neither shown nor suggested by any of the references, taken alone or in the attempted combination thereof.

Claim 1 is submitted to clearly distinguish patentably over the prior art in its present form. The claim defines a solid-state image pick up device which includes a first set of a plurality of light receiving elements and a second set of a plurality of light receiving elements. In the first set, at least one of the corresponding transfer electrodes is activated and simultaneously at least one of the transfer electrodes is inactivated in first and second image pickup operations. In the second set, all of the corresponding transfer electrodes are inactivated in the first image pickup operation, and at least one of the transfer electrodes is activated and simultaneously at least one of the transfer electrodes is inactivated in the second

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image pickup operation. The combination of claim 1 is further characterized in terms of "wherein the electric charges generated in the second set of light receiving elements are directly discharged from the second set of light receiving elements to the semiconductor substrate in the first image pickup operation".

Claims 2 and 3 depend, directly or indirectly, from claim 1 and contain all of the limitations thereof. Therefore, claims 2 and 3 are also submitted to clearly distinguish patentably over the art.

Claim 4 depends from and further defines claim 1 in terms of the difference in impurity concentrations between a channel for the first set of light receiving elements P1 and a channel for the second set of light receiving elements P2. Neither of the light receiving elements P1 or P2 corresponds to a horizontal transfer channel. Consequently, the invention as defined in claim 4 is unrelated to the configuration of Takahashi, which provides a difference in impurity concentrations between vertical and horizontal transfer channels. Claim 4 is submitted to clearly distinguish patentably over the art.

In conclusion, claims 1-4 are submitted to clearly distinguish patentably over the art for the reasons discussed above. Therefore, reconsideration and allowance are respectfully requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles telephone number (213) 337-6846 to discuss the steps necessary for placing the application in condition for allowance.

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If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,

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Date: December 17, 2003

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